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and that which is found in the neighborhood of Taunton are usually so nearly in the condition in which it was originally formed that even the accustomed eye fails readily to detect any change in its structure, from compression. At other points to the northward the distortion of the elements which compose the conglomerate is very great indeed. The inquiry into the history of this great change must be made in connection with our study of the dynamic history of the beds of the island.

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### REVIEWS AND BOOK NOTICES.

THE EVOLUTION OF LIFE.\* — An exceedingly interesting and suggestive book, as it is so full of the spirit of Hæckel's writings, of which it is in large part a condensation. We doubt not that it will be extensively read by those interested in natural history studies, though more especially designed to place before the general reader "a condensed view of the evidences for the theory that the animal and vegetal worlds have been very gradually developed or evolved, as distinguished from the hypothesis of their sudden special creation." For the purpose of popular exposition the author's style is excellent, being simple and concise. As we suggested, the work is a reflection of Hæckel's "History of Creation," a remarkable book by a remarkable man. The successor of Oken at Jena, he partakes largely of his spirit, and with much that is strikingly original and suggestive in his popular works, there are portions that are highly exaggerated, facts being sometimes strangely twisted to suit his theory. Hæckel's guesses and assumed intermediate types may be in many cases proved true years hence, but the history of evolution cannot be written by one man in a single century. The "Evolution of Life" must be judged by the same canons of criticism. The impression made on our mind after examining it is, that the author is far more sure of his deductions and grouping of facts than would be a specialist in any one of the classes of animals, whose supposed genealogy he indicates in some cases, at least, with a degree of overconfi-

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\*Evolution of Life. By H. C. Chapman, M.D. Philadelphia, J. B. Lippincott & Co. 1873 (received Oct. 9, 1872). Svo. pp. 193. With diagrams and plates. \$4.00.

dence. In a word, we doubt whether the candid, cautious zoological expert, though a believer in evolution, would accept many of the apparent conclusions of this taking book. For instance, the homologies of the sponges with the polypes are accepted to their fullest extent by the author, so of the holothurians with the worms, and more especially the supposed passage of the ascidians into the vertebrates. A few explanatory words bridge over the intervals between these grand divisions of animals as if the matter had passed discussion.

In all candor we should say after a second reading of the chapter on Echinodermata, that it is a fair specimen of zoology run mad; but for that matter, though agreeing with the general evolutionary views of the author, the errors to which we refer are to be found in the parent of the present work, Hæckel's brilliant and remarkable but faulty "History of Creation," a true child by intellectual descent of Oken's "Physiophilosophy."

We proceed to some special criticisms. Is the animal figured so rudely (many of the figures are exceedingly poor) and described on p. 37 really a *Sipunculus*? Both the figure and description remind us rather of *Synapta*. The author on p. 40 adopts Hæckel's strange and misleading view as to the organization of the starfish, in the following language. "The arm of a starfish is, in fact, a worm; not simply resembling one but structurally the same, the segmentation, the water vascular system, the nervous cord in each arm of the starfish being exactly the same as that of an articulated worm [!!]. The starfish has probably been produced through the union of five worms, the worms having united at their posterior ends, since the eyes are seen at the free ends of the starfish [!!!]." This we also find in Hæckel's "History of Creation," though Hæckel figures the embryo of the starfish. Thanks, however, to the labors of Johannes Müller, Professor and Mr. A. Agassiz, and Wyville Thompson, we have such accurate information as falsifies this singular conception. Farther on, Dr. Chapman concludes, and this is a specimen of his over-confident, uncritical mode of dealing with these subjects, that "The origin of the Asteridæ, or starfishes, from the worms is in perfect harmony with the structure, development and petrified remains of the group. The most striking facts of their economy are explainable on such a theory, but are perfectly meaningless on any other." No one whose conception was not founded on mere second-hand,

book knowledge could write like this. We would inquire whether what we know of the embryology of the Comatula from the researches of Wyville Thompson does not point to the evolution of the Crinoids from the lower Radiates, the Acalephs, and further on from the Hydra? From the researches of Müller, Professor Agassiz and Mr. A. Agassiz, the embryos of the three classes seem readily homologized, and the forms of the embryo of the starfish which so strikingly resembles some worms, such as *Sipunculus*, *Balanoglossus* and *Nemertes* for example, are perhaps the result of similar modes of life, and not of genetic significance; farther than that they possibly indicate a protozoan origin. Again, the inadequacy of the author's knowledge of the invertebrates is conspicuous in the statement on page 44 that the "centipedes, insects and spiders are joined in one division, Tracheata," when any text book would have told him that the spiders do not have tracheæ. While, as he says, the Myriopods are composed of numerous segments, "in the insect we can distinguish only three segments known as head, thorax and abdomen." . . . "So in the Arachnida we find only two segments [!!]." A moment's glance at a specimen would have saved such a sad blunder. The matter is scarcely mended by the statement on the next page that "the numerous segments of which the immature insect and spider are composed gradually coalesce, until finally the perfect insect exhibits only three pieces, the spider two."

Though the portion on the invertebrates is often weak and faulty, the remaining chapters seem to be more carefully prepared, though the tone of the book, like Hæckel's, is that of an advocate, the adverse facts being kept in the background. Read with due caution, the book is a fair résumé of the opinions of many able naturalists as to the probable mode of development of man and the lower organisms.

ILLUSTRATIONS OF NORTH AMERICAN MOTHS.\*—This is a valuable work and worthy of all encouragement, as it gives systematic descriptions (compiled when the author has not had specimens) of the North American (north of the Mexican boundary) species of two extensive and most interesting groups of moths. It offers good

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\* Illustrations of the *Zygænidae* and *Bombycidae* of North America. By R. H. Stretch. Vol. 1, parts 1-5. San Francisco, 1872. 8vo. Each part 32 pages. Price, uncolored, 75 cents a number; colored, \$1.00. Send subscriptions to author, or the Naturalists' Agency.